Spin meeting minutes, 2/7/2007

Ernest presented the simple model tracking results for horizontal resonances. His tracking is based on hard edge snakes with crossing speed $\alpha = 4.3 \times 10^{-5}$. Four particles on the surface of 15π horizontal emittances were used in the tracking. The horizontal tune started as 8.70 and ramped up to 8.95 around $G\gamma = 5.5$. The tracking was done with fixed crossing speed through the whole ramp ($G\gamma = 4.5$ to 46.5). His tracking includes various cold snake strengths (2.1T and 2.5T) with warm snake on. The results show that for 2.1T cold snake, a 10% polarization loss is seen at $G\gamma = 46.5$ with $\nu_x = 8.95$, while a 2.5% polarization loss is seen at $G\gamma = 46.5$ with $\nu_x = 8.955$. Adding vertical resonances ($\nu_y = 8.99$)with 10π emittance only changes the polarization loss from 2.5% to 5%. Instead, if a 15% cold snake is used, the horizontal tune can be relaxed to 8.94 and a smaller polarization (2%) is achieved. The conclusion is that 15% cold snake is better than the 10% one. In addition, the tracking was done with particles on the surface of the emittance, and the polarization loss of a ensemble of particles with same emittances should be even smaller. Nick asked if the tracking started with matched spin or not. Ernest said the tracking started with matched spin at the beginning, but he can track it with vertically injected beam. The discussion went on to the modeling of the snake. The stronger snake may have aperture problem due to dispersion and beta waves introduced by the snake. The solution we used last year was done in such a way that the beam physical sizes remained constant while ramping the energy. As a consequence, the vertical tune has to dip first before ramping up. This solution needs to be revisited as we push horizontal tune higher now.

Haixin